① Given $y = x^2 e^{\frac{1}{x^2}}$, find local extrema

② Find $f(x)$ if $f'(x) = x^{-5} + e^{-x}$

$f(x) = -\frac{1}{4}x^{-4} - e^{-x} + C$

③ Find the linearization $e^x + \sin x$ at $a = 0$

$f(a) + f'(a)(x-a)$

$1 + 2(x-0)$

$\boxed{L(x) = 2x + 1}$

$f'(x) = e^x + \cos x$

$f'(0) = e^0 + \cos(0)$

$1 + 1$

$$y = x^2 e^{\frac{1}{x^2}}$$

$$y' = x^2 \cdot e^{\frac{1}{x^2}} \cdot -2x^{-3} + e^{\frac{1}{x}} \cdot 2x$$

$$y' = \frac{-2e^{\frac{1}{x^2}}}{x} + 2xe^{\frac{1}{x^2}}$$

$$0 = \frac{-2e^{\frac{1}{x^2}}}{x} + 2xe^{\frac{1}{x^2}}$$

$$\cancel{2}\cancel{e^{\frac{1}{x^2}}} = \cancel{2}x^2\cancel{e^{\frac{1}{x^2}}}$$

$$1 = x^2$$

$$x = \pm 1, 0$$

$-$		$+$		$-$		$+$
	-1		0		1	
	min		undef.		min	

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$f(x) = x + \ln(x+1)$

$f'(x) = 1 + \frac{1}{x+1}$

$0 = 1 + \frac{1}{x+1}$

$-1 = \frac{1}{x+1}$

$-x-1 = 1$

$x = -2$ Not in range of $0 \le x \le 3$

$x = 0$ then $f(x) = 0$ one solution

M.V. guarantees $f'(c)$ would take on every value between $f(b)$, $f(a)$ that the function takes on

$\boxed{4.3}$

#4, 12, 13, 31, 37

$\boxed{4.5}$

#4, 6, 21, 23, 28, 29